IN THE CLAIMS:

1. (Previously Presented) An integrated optics encryption device comprising:

a wave guide having an input, a first optical path with a controllable refractive index, a second optical path with a controllable refractive index, and an output;

a coherent light source connected to the input of the wave guide;

a message signal source connected to the wave guide for controlling the refractive index of the first optical path; and

a key signal source connected to the wave guide for controlling the refractive index of the second optical path;

whereby an encrypted message appears at the output of the wave guide, the encrypted message comprising light split from the coherent light source that passed through the first optical path combined with light split from the coherent light source that passed through the second optical path.

2. (Original) The integrated optics encryption device of Claim 1 where the wave guide produces "exclusive or" functionality based on the message signal input and the key signal input.

3. (Original) The integrated optics encryption device of Claim 1 where the coherent light source is a laser diode.

4. (Original) The integrated optics encryption device of Claim 1 where the wave guide further comprises an encrypted message signal output.

5. (Cancelled)

6. (Currently Amended) The ~~integrated optics encryption device~~ apparatus of Claim ~~5~~ 28 where the first and second optical paths of the ~~multi-functional integrated optics chip~~ apparatus are divergent paths, each path comprising an end.

7. (Currently Amended) The ~~integrated optics encryption device~~ apparatus of Claim 6 further comprising a loop ~~connected to the multi-functional integrated optics chip~~ at the end of each path.

8. (Currently Amended) The ~~integrated optics encryption device~~ apparatus of Claim 6 wherein each end is mirrored.

9. (Currently Amended) The ~~integrated optics encryption device~~ apparatus of Claim ~~5~~ 28 where the first and second optical paths of the ~~multi-functional integrated optics chip~~ apparatus are divergent paths that meet at a convergent end.

10. (Currently Amended) The ~~integrated optics encryption device~~ apparatus of Claim ~~5~~ 28 where at least one signal generating means is connected to ~~the message signal input~~ affect the refractive index of the first optical path and at least one signal generating means is connected to ~~the key signal input~~ affect the refractive index of the second optical path.

11. (Cancelled)

12. (Cancelled)

13. (Currently Amended) An integrated optics encryption device comprising:

a multi-functional integrated optics chip, having an input, an output, a message signal input, a key signal input, and two ~~divergent~~ optical paths with mirrored ends;

a signal ~~generating means~~ generator connected to the message signal input of a first optical path for controlling the refractive index of the first path;

a signal ~~generating means~~ generator connected to the key signal input of a second optical path for controlling the refractive index of the second path; and

a coherent light source connected to the input of the multi-functional integrated optics chip;

whereby an encrypted message appears at the output based on the message signal input and key signal input~~; and~~

~~the encrypted message comprises light split from the coherent light source split between two parallel optical paths within the multi-functional integrated optics chip and subsequently recombined to form the encrypted message~~.

14. (Currently Amended) The integrated optics encryption device of Claim 13 where the message signal input ~~is~~ connected to ~~one~~ the first path ~~of the two parallel optical paths and can~~ reversibly ~~alter~~ alters the refractive index of the first path ~~to which it is connected~~ and the key signal input ~~is~~ connected to the ~~other~~ second path ~~of the two parallel optical paths and can~~ reversibly ~~alter~~ alters the refractive index of the second path ~~to which it is connected~~.

15. (Original) The integrated optics encryption device of Claim 13 where at least one signal generating means connected to the key signal input is a random number generator.

16. (Original) The integrated optics encryption device of Claim 13 where the coherent light source is a laser.

17. (Original) The integrated optics encryption device of Claim 13 where the coherent light source is a laser diode.

18. (Cancelled)

19. (Cancelled)

20. (Cancelled)

21. (Cancelled)

22. (Currently Amended) A method for encryption ~~using interference from a coherent light source~~ comprising the steps of:

~~issuing a coherent light signal from a coherent light source to a multi-functional integrated optics chip;~~

dividing ~~the~~ a coherent light signal from a coherent light source into two paths ~~within the multi-functional integrated optics chip~~;

~~issuing pre-determined signals to the two paths of the multi-functional integrated optic chip where~~ encoding a message signal ~~input is attached to one~~ on a first path of the ~~multi-functional integrated optics chip~~ coherent light signal by controlling the refractive index of the first path and encoding a key signal ~~input is attached to the other~~ on a second path of the coherent light signal by controlling the refractive index of the second path; and

recombining the divided encoded light signal to create an encrypted signal~~; and,~~

~~outputting the encrypted signal via an encrypted message output~~.

23. (Currently Amended) The method of claim 22 where the message signal ~~input~~ and key signal ~~input~~ reversibly alter the refractive index of the path ~~to which each input is connected~~.

24. (Currently Amended) The method of Claim 22 where the key signal is ~~connected to~~ a random number generator.

25. (Original) The method of Claim 22 where each path has a mirrored end.

26. (Currently Amended) A method for decryption ~~using interference from a coherent light source~~ comprising the steps of:

~~issuing a coherent light signal from a coherent light source to a multi-functional integrated optics chip;~~

dividing ~~the~~ a coherent light signal from a coherent light source into two paths ~~within the multi-functional integrated optics chip~~;

~~issuing pre-determined signals to the two paths of the multi-functional integrated optic chip where~~ using an encrypted message signal ~~input is attached to one~~ to modify a first path of the ~~multi-functional integrated optics chip~~ coherent light signal by controlling the refractive index of the first path and using a key signal ~~input is attached to the other~~ to modify a second path of the coherent light signal by controlling the refractive index of the second path;

recombining the divided modified light signal to create a message signal~~; and,~~

~~outputting the message signal via a message signal output~~.

27. (Cancelled)

28. (Currently Amended) ~~The~~ An apparatus ~~of claim 27~~ that produces an optical signal encoded with an encrypted message by splitting coherent light into a first optical signal and a second optical signal, encoding the first optical signal with a message to be encrypted ~~wherein the apparatus encodes the first and second optical signals~~ by controlling the flow of light through ~~two separate waveguides~~ a first optical path by controlling the refractive index of ~~each of the two separate waveguides~~ the first optical path, encoding the second optical signal with a key by controlling the flow of light through a second optical path by controlling the reflective index of the second optical path, and combining the first and second optical signals to produce the optical signal encoded with an encrypted message .

29. (Cancelled)